CLAIMS

1. A device for mixing and distributing a liquid phase and a gas phase inside a vertical reactor upstream of a granular bed or between two successive granular beds, said device comprising:

- a substantially horizontal plate (20) covering the entire cross section of the reactor and supporting a plurality of substantially vertical conduits (40) comprising an upper end (43) communicating with the portion of the reactor located above the plate (20) and a lower end (21) communicating with the portion of the reactor located below the plate (20);
- said conduits comprising lateral orifices (42) at different levels disposed along their vertical wall and allowing the gas phase and the liquid phase to be introduced into the conduits at least partially in a separated manner;
- said device being characterized in that it comprises a substantially vertical inner wall (30) located in the space comprised between the wall of the reactor and the zone occupied by the conduits, and defining with said outer wall an annular zone (28) which receives at least the liquid phase from outside the reactor and which communicates with the central portion of the plate (20), in particular by means of lower cross sections of flow (32).

2. A device according to claim 1, in which the distance separating the lower cross sections of flow (32) and the lowest lateral orifices (42) of the conduits (40) is more than 20 mm and is preferably in the range 100 to 300 mm, the lower cross sections of flow (32) being disposed below the lateral orifices (42).

3. A device according to claim 1 or claim 2, comprising a plurality of lower cross sections of flow entirely or mainly disposed in the lower half of the inner wall (30).

4. A device according to one of claims 1 to 3, in which the dimensions of the lower cross sections of flow (32) are such that the liquid level in the annular zone remains below the overflow level corresponding to the upper portion of the inner wall (30).

5. A device according to any one of claims 1 to 4, in which the dimensions of the lower cross sections of flow are such that the flow rate of the liquid phase through said lower cross sections of flow (32) is in the range 0.5 to 5 m/s.

6. A device according to any one of claims 1 to 5, in which the width of the annular zone (28) is less than 5% of the diameter of the reactor, and preferably less than 2% of the diameter of the reactor.

7. A device according to any one of claims 1 to 6, in which the inner wall (30) is higher than the level of the highest lateral orifices (42) and lower than the level of the upper end (43) of the conduits (40).

8. A device according to any one of claims 1 to 7, in which the upper portion of the annular zone (28) is closed by a top (35) which renders it tight to the gas phase.

9. A chemical reactor comprising a device according to one of claims 1 to 8, said reactor comprising one or more fixed beds at least one of which is supplied with a downflowing co-current of a gas phase and a liquid phase, the volume ratio between the gas phase and the liquid phase being in the range 1 to 400, and preferably in the range 1 to 100.

10. A process for the selective hydrogenation of hydrocarbons containing 2 to 7 carbon atoms in at least one reactor according to claim 9 and/or comprising a device according to one of claims 1 to 8.

11. A process for the hydrotreatment of hydrocarbons in at least one reactor according to claim 9 and/or comprising a device according to one of claims 1 to 8.